

BOEM ENVIRONMENTAL STUDIES PROGRAM: Ongoing Studies

Region: Headquarters

Planning Area(s): All

Title: Improving Emission Estimates and Understanding of Pollutant Dispersal for Impact Analysis of Beach Nourishment and Coastal Restoration Projects (NT-10-10)

Conducting Organization: ENVIRON International

Total Cost: \$138, 759

Period of Performance: FY 2010-2012

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Description:

Background: The Clean Air Act (CAA) requires BOEM to ensure that any action authorizing the use of Outer Continental Shelf (OCS) sand resources in coastal restoration and beach nourishment projects does not cause or contribute to air quality violations in areas not meeting the National Ambient Air Quality Standards (NAAQS), or does not cause a violation of these standards in areas that meet the NAAQS. BOEM also evaluates the potential impacts to air quality under its National Environmental Policy Act (NEPA) mandate. Estimating a proposed activity's emissions and evaluating the degree of atmospheric dispersion of pollutants and greenhouse gases over the shallow inner shelf and coastal region are key elements of evaluating the potential effect on local air quality and determining appropriate mitigation.

The Marine Minerals Program (MMP) generally requires applicants to estimate potential emissions of criteria pollutants emitted by vessels, mobile non-road, and off-road sources. The diesel engines used in these projects often contribute to locally-elevated concentrations of nitrogen oxides, as well as increased concentrations of carbon monoxide, sulfur oxides, particulate matter, and volatile organic compounds. Emissions inventories are currently prepared from a very limited number of project-specific forecasts of volume requirements and activity duration, data on fuel consumption, equipment horsepower, estimated loading ratings (% power), and emission factors (mass of pollutant released per unit energy). Information needs to be collected to refine the parameterizations and assumptions used to estimate emissions from dredge plants and tiered beach construction equipment.

Project-specific inventories have shown that the bulk of emissions are generated by the dredges' diesel engines used during propulsion, draghead/cutterhead operation, and pump-out. However, the relative contribution towards established limits ultimately depends on the volume requirements, duration of the project, and the distance of the borrow area to state waters and the pump-out location(s). Past analyses have generally been done for projects that are proposed in attainment areas, and these have shown that potential emissions are relatively minor in context of regional point and mobile sources. Nonetheless, the majority of inventories still approach the threshold level for nitrogen oxides (NO_x) that would require a

conformity determination be prepared for proposed projects in maintenance and non-attainment areas.

Also, there is limited understanding about the nature of pollutant transport and dispersal from dredges operating offshore, besides that fact that it depends crucially on prevailing winds. The application of an overwater plume transport and dispersion model would greatly improve our current understanding of the relative distances over which pollutants are dispersed and the extent that offshore activity actually contributes to elevated pollutant concentrations over state waters, especially considering most dredging operations occur near the state/federal boundary.

Objectives: The principal objectives for this study include:

1. refining (i) operational characteristics (ii) activity profiles, (iii) loading factors for each activity, and (iv) emission factors for equipment types;
2. developing a standard approach to estimate emissions using a methodology and tool adaptable for use with regional inventories; and,
3. characterize the space and time scales relevant to plume transport and dispersion for use in future environmental analyses.

Methods: First, the contractor is performing a literature/technical report review, including BOEM, U.S. Army Corps of Engineers, and U.S. Environmental Protection Agency (EPA) funded research, to compile information about operational characteristics, activity profiles, loading factors, and emission factors. The contractor will then survey major U.S. dredge contractors and analyze dredge operational and fuel consumption data from representative projects to compile and refine operational characteristics, activity profiles, loading factors, and emission factors for dredge plants. The next phase includes developing a function-specific input/output (I/O) calculator to prepare emissions inventories using accepted emission inventory methodologies and the information compiled in the first phase. During the last phase, the contractor will model different project scenarios to describe plume transport and dispersion using hypothetical conditions for one or two geographic areas, adequately representing seasonal variations in meteorological conditions. Existing meteorological datasets will be used to the extent possible.

Importance to BOEM: Better estimates of potential emissions coupled to a pollutant dispersion model will provide the basis for improved NEPA analyses and Conformity Determinations, as well as effective mitigation and monitoring requirements if so needed.

Current Status: ENVIRON has compiled all the relevant data, vetting the information about operational characteristics, activity profiles, loading factors, and emission factors with the U.S. EPA. ENVIRON has also completed initial programming, parameterization, and testing of the emissions inventory calculator.

Final Report Due: September 30, 2012

Revised Date: February 1, 2012

Publications: None

Affiliated WWW sites: None

ESPIS: Environmental Studies Program Information System

All completed ESP studies can be found here:

http://www.data.boem.gov/homepg/data_center/other/espis/espismaster.asp?appid=1